Analytical Chemistry Homeworks.

التاريخ / /

الموضوع

1- Calculate the molecular weight for the

a) $CaSO_4 \cdot 2H_2O$ b) $(CH_3)_2CHNH_2$ c) H_2SO_4

d) $Mg(OH)_2$ e) $CaCl_2$ h) NH_4NO_3

solutions:

a) $CaSO_4 \cdot 2H_2O = 40 \times 1 + 32 \times 1 + 16 \times 6 + 4 \times 1 = 172$ g/mol

b) $(CH_3)_2CHNH_2 = 12 \times 3 + 1 \times 9 + 14 \times 1 = 59$ g/mole

c) $H_2SO_4 = 1 \times 2 + 32 \times 1 + 16 \times 4 = 98$ g/mole

d) $Mg(OH)_2 = 24.3 \times 1 + 16 \times 2 + 1 \times 2 = 58.3$ g/mol

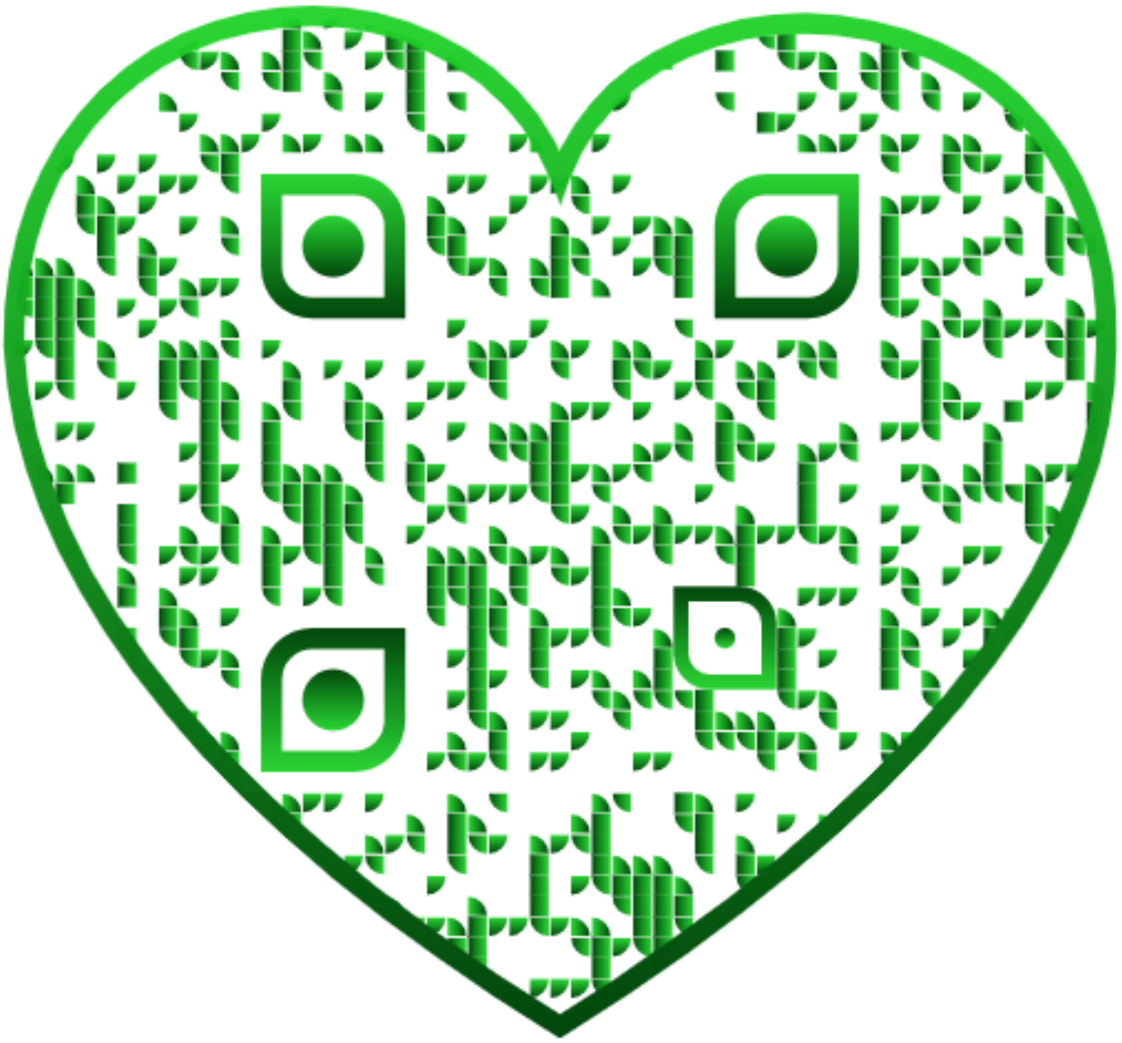
e) $CaCl_2 = 40 \times 1 + 35.5 \times 2 = 111$ g/mole

h) $NH_4NO_3 = 14 \times 2 + 1 \times 4 + 16 \times 3 = 80$ g/mole

الوزن الجزيئي

Ca = 40 , Cl = 35.5 , S = 32 , O = 16 , H = 1

N = 14 , Mg = 24.3



التاريخ

الموضوع: واجبات كيمياء تحليلية

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(2) How many moles are containd in 2g of benzoic acid. M.wt = 122.1 g/mole

solution:

n = ?? mass = 2g M.wt = 122.1 g/mol

$\therefore n = \frac{mass}{M.wt}$ $\therefore n = \frac{2}{122.1} = 0.0164$ moles

(3) what is the mass of 0.205 mole Na_2CO_3

M.wt = 106 g/mole

solution:

mass = ?? n = 0.205 moles M.wt = 106 g/m

mass = n x M.wt $\Rightarrow$ mass = 0.205 x 106

= 21.73 g

(4) what the mass of O_2 that is regired to react with 25g of CH_4? C=12 H=1 O=16

$CH_4 + 2O_2 \longrightarrow CO_2 + 2H_2O$

solution:

M.wt CH_4 = 16 $n_{CH_4} = \frac{25}{16} = 1.5625$ moles

① $n_{O_2} = n_{CH_4} \times \frac{2 \text{ mole } O_2}{1 \text{ mole } CH_4} \Rightarrow n_{O_2} = 1.5625 \times \frac{2}{1}$

$n_{O_2} = 3.125$ ② $mass_{O_2} = n \times A.wt = 3.125 \times 32$

$mass_{O_2} = \boxed{100 \text{ g}}$

/ / التاريخ الموضوع

Analytical Chemistry Homeworkes

(5) when 6g of NaCl was dissolved in H_2O to prapere 72g of NaCl solution. The density of $NaCl_{sol}$ = 1.21 g/ml calculate the :-

① precent NaCl in (w/w)

② " " " (w/v)

③ strength of NaCl solution.

solution

m_{NaCl} (solute) = 6g ، m_{H_2O} = ?? ، $m_{NaCl\,sol}$ = 72g

$d_{NaCl\,sol}$ = 1.21 ، w/w = ?? ، w/v = ?? ، S = ??

④ $m_{H_2O} = m_{NaCl\,sol} - m_{NaCl}$

$m_{H_2O} = 72 - 6 = \boxed{66\,g}$

1- $NaCl\,(w/w)\,\% = \frac{\text{mass of solute}}{\text{mass of solution}} \times 100\%$

" " $= \frac{6}{72} \times 100\% = \boxed{8.33\%}$

2- $NaCl\,(w/v)\,\% = \frac{\text{mass of solute}}{\text{volum of solution}}$

$\therefore V = \frac{m}{d} \Rightarrow \frac{72}{1.21} = \boxed{59.5\,ml}$

$\therefore NaCl\,(w/v) = \frac{6}{59.5} \times 100\% = \boxed{10.08\%}$

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③ $S = \frac{\text{mass of solut}}{\text{volum of solution}} = \frac{6}{59.5} \times 1000 = \boxed{100.8\,g/L}$

analytical Chemistry Homeworkes -

6) When 6g of NaCl was dissolved in 66g of H_2O to prepare 8.33% w/w NaCl solution $d = 1.21\ g/mL$ calculate:-

1- mass of NaCl solution
2- volume of NaCl solution
3- precent of NaCl in (W/V)
4- strength of NaCl solution.
5- The molefraction of NaCl and H_2O
6- The molality of NaCl solution.
7- The concentration of NaCl in PPM

solution.

$m_{NaCl} = 6g$ / $m_{H_2O} = 66g$ / $d_{NaCl\,sol} = 1.21\ g/mL$
W/w = 8.33 % / $m_{NaCl\,sol}$ / V, W/V, S, X_{NaCl}, X_{H_2O}, M, C PPM

$$-(W/w)\% = \frac{\text{mass of solute}}{\text{mass of solution}} \times 100\%$$

$$\Rightarrow 8.33\% = \frac{6}{\text{mass of solution}} \times 100\%$$

(1) $$\text{mass NaCl solu} = \frac{600}{8.33} = \boxed{72\,g}$$

② $V_{NaCl\ sol^n} = \frac{m}{d} \Rightarrow V = \frac{72}{1.21} = \boxed{59.58\ mL}$

③ $(W/V)\% = \frac{\text{mass of solute}}{\text{Volum of solution}} \times 100\%$

$W/V\% = \frac{6}{59.58} \times 100\% = \boxed{10.1\%}$

4- $S = \frac{\text{mass of solute}}{\text{Volum of solution}} = \frac{6}{59.58} \times 1000$

$\Rightarrow S = \boxed{100.7\ g/L}$

5- $X_{NaCl} = \frac{n_{NaCl}}{n_t}$; $n_{NaCl} = \frac{6}{58.5} = \boxed{0.103\ mol}$

$n_{H_2O} = \frac{66}{18} = \boxed{3.67\ moles}$

$\therefore n_t = 0.103 + 3.67 = 3.77\ moles$

$\therefore X_{NaCl} = \frac{0.103}{3.77} = \boxed{0.03}$

$X_{H_2O} = \frac{3.67}{3.77} = \boxed{0.97}$

أو بطريقة أخرى $\rightarrow X_{H_2O} = 1 - X_{NaCl} \Rightarrow X_{H_2O} = 1 - 0.03 = 0.97$

6- $m = \frac{\text{moles of solute}}{\text{mass of solvent}} \Rightarrow m = \frac{0.103}{66}$

$\Rightarrow m = \frac{0.103}{66} \times 1000 = \boxed{1.56\ mol/kg}$

7- $C_{PPM} = \frac{\text{mass of solute}}{\text{mass of solution}} \times 10^6\ ppm$

$= \frac{6}{72} \times 10^6 = \boxed{0.08 \times 10^6\ ppm}$

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قوانين هامة

1- $n = \frac{mass(g)}{M.wt}$ moles n = عدد المولات $M.wt$ = الوزن الجزيئي

2- $mass = n \times M.wt$

3- number of any element in compound = no of compound moles $\times \frac{\text{number of Element Atom}}{\text{1 mole of compound.}}$

4- $d = \frac{m}{V} \Longrightarrow V = \frac{m}{d}$ V = الحجم m = الكتلة d = الكثافة

5- percent in $(W/w)\% = \frac{\text{mass of solute}}{\text{mass of solution}} \times 100\ \%$

6- percent in $(W/V)\% = \frac{\text{mass of solute}}{\text{Volume of Solution}} \times 100\ \%$

7- percent in $(V/V)\% = \frac{\text{volume of solute}}{\text{volume of solution}} \times 100\%$

8- strength of solution $(S) = \frac{\text{mass of solute (g)}}{\text{volum of solution (L)}}$ g/L

9- $X_A = \frac{n_A}{n_t}$ ، $X_B = \frac{n_B}{nt}$ ، $X_A + X_B = 1$

10- molality $= \frac{\text{moles of solute}}{\text{mass of solvent}}$ mole/kg

11- $C_{ppm} = \frac{\text{mass of solute}}{\text{mass of solution}} \times 10^6$ ppm

12- $C_{ppb} = \frac{\text{mass of solute}}{\text{mass of solution}} \times 10^9$ ppb